# Use of Chatbot on Online Store Website as Virtual Customer Service to Improve Sales

Yosi Afandi*, Maskur, Tri Ramadani Arjo

Business Administration Dept.

State Polytechnic of Malang

Malang, Indonesia*

*yosi.afandi@polinema.ac.id, maskur@polinema.ac.id, tri.ramadani@polinema.ac.id

*Abstract*—**The rapid development of information technology is marked by the number of computer users for business purposes. An online shop is the activity of purchasing goods or services through the internet so that sellers and buyers do not meet in person. In this case, Customer Service is needed to serve prospective buyers. The online shop used in the case study is batik which sells batik products typical of Malang. In this study, the Virtual Customer Service prototype through the A.L.I.C.E (Artificial Internet Linguistic Computer Agency) knowledge base is a chatbot application that is currently being developed. A.L.I.C.E Chatbot knowledge base is based on AIML (Artifical Intelligence Markup Language). Conversations between prospective buyers and Virtual Customer Service with the aim that if the answers in the database are not found, it will add new knowledge by looking for information relevant to questions on the website. Prospective buyers can easily ask directly about the information on the online shop. With the use of chatbots that are equipped with artificial intelligence, it makes it easier for users to get information from a database that is informed to prospective buyers quickly with accurate answers to about 87% of questions and relevant answers.**

*Keywords—information, chatbot, artificial intelligence, database*

## I. INTRODUCTION

With the development of the times, by implication, it has supported the rapid development of technology. Information is one of the keys in the current era of globalization. All activities will require information, so it can be said that all activities carried out are required to produce useful information for everyone. The very rapid development of information technology has entered almost all areas of life, this is in almost all problems with the large number of users, both for the benefit of companies or businesses to computer matters that are entertainment, education, health, and trade which are always experiencing developments such as online stores.

An online shop is an activity to purchase goods or services through the internet so that the seller and the buyer do not need to meet in person at one place. This is needed by a customer to serve the buyer. With the development of computer technology today, customer service is needed to meet customer needs, especially in online stores, where a customer cannot meet face to face with the seller / online shop. Sometimes many customers are still wondering about the products they want to buy at an online store, for example, such as models, materials used, sizes, and quality of goods. Therefore, we need a system that can assist customers in finding information about the items the customer wants to buy without having to come directly to the online shop. Apart from wasting time and energy, this is also very inefficient because there is no certainty that the distance between the customer's position and the online store is close to each other. Therefore, we need a system that can help customers find information about the items they want to buy without having to come to the online shop.

In this case, the researcher will make a prototype of the Virtual Customer Service Application program through the A.L.I.C.E (Artificial Linguistic Internet Computer Entity) knowledge base which is one of the chatbot applications that are currently developing. Knowledge on A.L.I.C.E Chatbot based on AIML (Artificial Intelligence Markup Language). This AIML generates a chatbot that can integrate input received in the form of text. So that a conversation will be generated between prospective buyers and Virtual Customer Service by adding new knowledge with the aim that if the answers in the database are not found, the system will add new knowledge by searching for information that is relevant to the statements on the specified website. The online shop used for the case study is poor batik which sells products from the typical Malang batik cloth.

Referring to previous research Satriya [1] entitled Implementation of the Student Information Center for Web and Mobile-Based Informatics Engineering Study Programs, wanted to develop a more complex search process. Where in previous studies the search process was only based on keywords from the user, if there are no keywords that match the data in the database, then the answer is not found. Here the author will develop a semantic-based search using ontology, where if the keywords entered by the user do not match those in the database, the system will look for answers that have a value similar to the keywords that have been inputted, then the system will crawl data on the specified website.

In making it easier to get information, prospective buyers can immediately ask about the information on the online store. With the use of chatbots that are equipped with artificial intelligence, it makes it easier for users to get information from a database that is informed to users quickly with an accuracy of about 95% of the relevant questions and answers. With this research, it is hoped that it can further assist buyers in finding information about the product to be purchased and improve the quality of service at online stores at a more optimal level [2].

Chatterbot (or chatbot, or bots) is a computer program built to simulate an intellectual conversation with one or several humans either audio or text. Initially, this computer program (bots) was tested by the Turing Test, by not showing its identity as a machine so that it could trick someone who was in dialogue with it. If the user or user cannot identify the bots as a machine or a computer program, then the chatterbot can be categorized as Artificial Intelligence [3].

A.L.I.C.E (Artificial Linguistic Internet Computer Entity) is a chatbot application that is currently being developed. A.L.I.C.E uses a programming language called AIML (Artificial Intelligence Mark-up Language) which has a specific function, namely as a conversation agent between users and machines, which is further adopted by many other alicebots. A.L.I.C.E was first developed by Dr. Richard S. Wallace in 1995. A.L.I.C.E was inspired by Eliza who was created by Dr. Joseph Weizenbaum in 1966. A.L.I.C.E was first implemented using SETL, and was rewritten in 1998 using the java programming language, known as Program B. Then in 1999 Program B was released [4].

Artificial Intelligence Markup Language describes a class of data objects called AIML objects and separately describes the environment of the computer program that processes that AIML. AIML object consists of units called topics and categories that contain parsed (translated sentence data) and unparsed data (sentences have not been translated). Parsed data consists of characters, character data, and AIML elements [5,6].

Web crawler (also as robot of spider) is a system for downloading web pages in bulk. Web crawlers are used for many purposes. Its primary purpose is to be one of the main components of a web search engine, a system that assembles a web corpus, indexes it, and allows users to query the index and find web pages that match the query. A related use is for web archiving (the provision of services such as internet archiving), where a large collection of web pages is periodically collected and archived for its derivatives [7].

Online shop is a shop or place to sell where most of the activities do not take place in the real world, but take place online. From this explanation, we can identify that not all activities in an online store take place online [8].

The use of chatbots that are equipped with artificial intelligence, makes it easier for users to get information from what is being informed to potential buyers quickly with accurate answers to about of questions and relevant answers.

## II. METHODS

*virtual customer service (chatbot) application is an* application that can help prospective buyers who will buy goods and as a step to meet customer needs in finding out information about products sold in online stores.
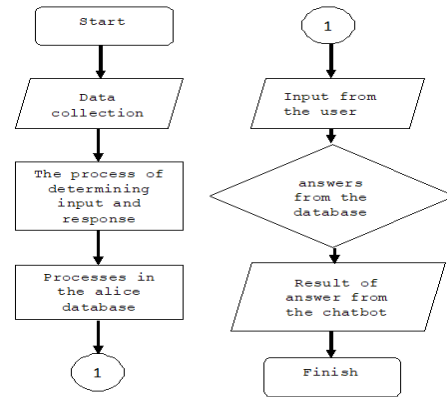


Fig. 1. Flowchart virtual customer service (chatbot) application.

### A. Data Source

*1) Database:* The data used in this study are questions that are often asked by customers of the Malang batik shop. The parameters used are about the products sold in online stores such as the name of the product / category. The data collection of questions obtained is stored in the database.

*2) Website:* The data used in this study also came from a predetermined website. The data is retrieved using web crawling using cURL and managed using the Simple HTML DOM library. The data needed is about the products sold in online shops including: batik cloth, Malang typical batik and batik models [9].

### B. Data Collection

This stage is the stage of data collection which will later be used for chatbots. Chatbot input data required for basic knowledge in AIML, simplification of complex grammatical forms into simpler forms, dividing sentences into sub-sentences, word equations, improving spelling and grammar [10].

### C. The Process of Determining Input and Response

The process of determining input and response is the second stage after the data has been obtained. In this process, the selection of input sentences and appropriate answers will be carried out.

### D. Process In the ALICE Database

The next step is to enter the selected data as input and answers into the ALICE database. Then the normalization process is carried out, which is a process where all the input sentences given are normalized first with the aim that they can be adjusted to the knowledge base according to the AIML form [11].

## E. Input from the User

In this section, the chatbot is tested with a number of input sentences or the input used has been defined in the research variables.

## F. Result of Answer from the Chatbot

Input sentences from users are used to get responses about the knowledge obtained from the supervised learning process and chatbots or previous user input sentences.

## G. Adding New Knowledge

Data search on the website is carried out if the output data or response from the chatbot is not included in the ALICE data. So the system will automatically perform crawlers to find the information desired by the user [12].

## III. RESULTS AND DISCUSSION

The results of research and discussion are the final stages of system development in which there is an implementation of research, discussion and testing. Tests are carried out to determine the success rate of system development.

## A. Database Implementation

The database is a data storage area used in this study to store data that has been obtained in the form of a collection of questions and answers. There are several tables used in the A.L.I.C.E database as follows:



Fig. 2. Database A.L.I.C.E.

From Figure 2 we can see that in the A.L.I.C.E database there is a table name "AIML", in the AIML table all data in the form of a collection of questions and answers will be stored.

## B. Specify a Pattern

In this research, the pattern used is Malang batik.

TABLE I. PATTERN MALANG BATIK

| No | Pattern | Hatpattern | Template | Topic | Recommendation |
|---|---|---|---|---|---|
| 1 | batik singosari | | Batik gantring khas malang | | Batik singosari |
| 2 | _batik singosari | | <srai>batik khas malang </srai> | | |
| 3 | batik singosari * | | <srai> batik khas malang </srai> | | |
| 4 | batik singosari * | | <srai> batik khas malang </srai> | | |

## C. Implementation of Interface Design

Interface design is a display that will connect the user to the application as a communication medium. The interface can receive information from the user and provide the information needed by the user. The following is a system interface that has been developed:
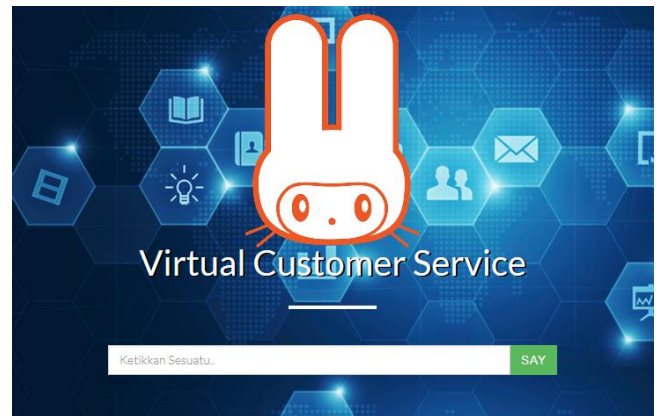


Fig. 3. Interface design virtual costomer service.

## D. Crawling Web Adding New Knowledge

Web crawling is a technique of retrieving data / content on a website. In this study, the authors used the cURL technique to do crawling on a predetermined website.

```
function crawl($url) {
    // start inisialisasi curl dan setting curl

    $ch = curl_init();
    curl_setopt($ch, CURLOPT_SSL_VERIFYHOST, 0);
    curl_setopt($ch, CURLOPT_SSL_VERIFYPEER, 0);
    curl_setopt($ch, CURLOPT_FOLLOWLOCATION, 0);
    curl_setopt($ch, CURLOPT_RETURNTRANSFER, 1);
    curl_setopt($ch, CURLOPT_URL, $url);
    // settingan ini bisa beda, ada yang diubah ada yang d
    // end inisialisasi curl dan setting curl

    $proses_curl = curl_exec($ch); // melakukan curl
    curl_close($ch); // menutup proses curl

    $html = str_get_html($proses_curl); // str_get_html()
```

Fig. 4.   CURL process.

After the cURL process is complete, the next step is to manage the data from the website that you want to retrieve. To manage data / content from the website, the Simple HTML DOM library is required. The process of managing web crawling data can be seen in the following figure:

```
require_once('simple_html_dom.php');

function crawl($url) {
    $ch = curl_init();
    curl_setopt($ch, CURLOPT_SSL_VERIFYHOST, 0);
    curl_setopt($ch, CURLOPT_SSL_VERIFYPEER, 0);
    curl_setopt($ch, CURLOPT_FOLLOWLOCATION, 0);
    curl_setopt($ch, CURLOPT_RETURNTRANSFER, 1);
    curl_setopt($ch, CURLOPT_URL, $url);

    $proses_curl = curl_exec($ch); // melakukan curl
    curl_close($ch); // menutup proses curl

    $html = str_get_html($proses_curl);

    $ambil_produk = $html->find('.product-grid-item');
    $produk = array();
    foreach ($ambil_produk as $list_kategori) {
        $nama_produk = $list_kategori->find('.product-title a', 0)->plaintext;
        $url_produk = $list_kategori->find('.product-title a', 0)->href;
        $foto_produk = $list_kategori->find('img', 0)->getAttribute('src');
        $produk[] = array('nama_produk' => $nama_produk, 'url' => $url_produk, 'foto' => $foto_produk);
    }

    return $produk;
}
```

Fig. 5.   Web Crawling data processing.



Fig. 6.   Web artificial intelligence-based chatbot application.

*E.  Validation Testing*

In validation testing, what is done is to compare the results of the response given by the chatbot with the response given by the user based on the response given by the chatbot by analyzing:

- Related topics between words or input from the user with the response given by the chatbot.

- The response to the answer given by the chatbot if the desired information does not exist in the A.L.I.C.E engine database.

TABLE II.  TEST RESULTS VALIDATION OF VIRTUAL CUSTOMER SERVICE APPLICATIONS

| No | Keyword | Expected Response | Results Evaluation |
|----|---------|-------------------|--------------------|
| 1 | Motif batik malang | Motif Bunga Teratai Motif Tugu Malang Motif Rumbai Singa Motif Sulur-sulur Motif Mahkota | Corresponding |
| 2 | Motif Batik malangan | Motif Hias Tumbuh-tumbuhan/Flora Motif Hias Manusia Motif Binatang/Fauna Motif Benda Alam (Motif sapu ular) Motif Sosial (Motif Kembang Api) | Corresponding |
| 4 | Warna apa saja yang digunakan | Merah Jingga Kuning-jingga Kuning Kuning-hijau Hijau Hijau-biru Biru Biru-ungu Ungu Merah-ungu Coklat Abu-abu Putih Hitam | Corresponding |
| 5 | Apa saja karakter batik malang | Batik Singosasi Batik Celaket Batik Druju | Corresponding |
| 6 | Apa saja motif batik singosari | Motif Pending Motif Parijoto Motif Padma Motif Renggo Motif Candi Singosari Motif Langsep Motif Kendedes. | Corresponding |
| 7 | Apa saja motif batik celaket | Motif rambut singa Motif tugu yang melambangkan semangat perjuangan. Motif batik Celaket didominasi motif flora berwarna ceria sebagai simbol Malang kota bunga. | Corresponding |
| 8 | Apa saja motif batik Druju | Motif bunga bamboo Mawar pupus Motif garis Anggur Motif kerrang Motif bola-bola Motif pulau sempu lainnya | Corresponding |
| 9 | Bagaimana proses produkti batik malang | Mencanting Menyolet Nembok Pewarnaan Pencelupan Pelorodan | Corresponding |
| 10 | Apa saja model batik malang | Baju Wanita Baju Pria Baju anak - anak | Corresponding |

Based on the test results in Table II, it can be said that the virtual customer service application is in accordance with what is expected. But it does not rule out the system may not be able to provide the desired response results due to the mismatch between the entered keywords and the data that has been entered in the A.L.I.C.E. database. So it is necessary to check regularly so that the system can always run as expected.

*F. Precision Testing*

Precision testing is done to determine the level of accuracy or compatibility of the system in providing results for keywords. The test scenario is carried out by testing 15 keywords in the ontology that has been built.

TABLE III.     PRECISION TEST RESULTS ON VIRTUAL CUSTOMER SERVICE SYSTEMS

| No | Keywords | The results obtained are relevant | Total results obtained | Precision (%) |
|---|---|---|---|---|
| 1 | Baju | 89 | 89 | 100 |
| 2 | Motif Batik | 28 | 30 | 93 |
| 3 | Warna | 12 | 12 | 100 |
| 4 | Ukuran | 14 | 18 | 78 |
| 5 | Model Batik | 14 | 19 | 74 |
| 6 | Motif Singosari | 6 | 6 | 100 |
| 7 | Motif Celaket | 27 | 27 | 100 |
| 8 | Motif Druju | 3 | 3 | 100 |
| 9 | Karakter Batik | 22 | 22 | 100 |
| 10 | Proses Produkti | 11 | 24 | 46 |
| 11 | Modek Batik | 13 | 18 | 72 |
| 12 | Janis Batik | 6 | 6 | 100 |
| 13 | Ukuran Batik | 19 | 24 | 79 |
| 14 | Variasi Batik | 21 | 21 | 100 |
| 15 | Bahan Batik | 7 | 11 | 64 |
| Average | | | | 87 |

The test results in Table II show that searching on virtual customer service applications using ontology has results that are quite relevant to the entered keywords. From the inputted keywords, the output results displayed from each keyword are close to the perfect value or according to the desired answer. It is proven by testing 15 keywords which have an average precision value of 87%.

IV. CONCLUSIONS AND RECOMMENDATIONS

*A. Conclusions*

The virtual customer service application can find the questions you are looking for in the A.L.I.C.E database according to what the user has entered. The system can search the afrakids.com website and add new knowledge if the question being searched does not exist in the A.L.I.C.E database. Virtual customer service (Chatbot) application using A.L.I.C.E with a domain around the products sold at the Malang batik shop provides relevant keyword search results with an average precision value of 87% of the 15 tested keywords.

*B. Recommendations*

Based on the description of the results of the virtual customer service (Chatbot) application, the author provides the following suggestions with the hope of developing this work again and most importantly it can provide benefits in the future.

In this study, the iteration process still needs to be added, so a more iteration process is needed so that the system can answer all possible questions. More topics about poor batik are needed so that questions from potential buyers can be answered. Additional sources are needed to add new knowledge so that if a prospective buyer question is not found in the database, it will look for the appropriate answer from crawling to the website.

REFERENCES

[1] A. Satriya, "Implementasi Pusat Informasi Mahasiswa Program Studi Teknik Informatika Berbasis Web dan Mobile," Univ. Muhammadiyah Malang, 2016.

[2] L. Afuan and Azhari, Penerapan Semantik Web Pada Ontologi Learning Resource, SENTIKA, 2016.

[3] M. Fatnuriyah, "Perancangan I_Bot (Sistem Informasi Chatbot) Menggunakan AIML Berbasis Program O Untuk Akses Sistem Informasi PMDFT," Universitas Brawijaya.

[4] M. Yuni, "Pengembangan A.L.I.C.E sebagai Chatbot Pakar Jaringan Komputer Berbasis Website," Universitas Muhammadiyah Malang, 2015.

[5] R. Wallace, The Elements of AIML. 2003.

[6] I. Wicaksana, Ontology: Bahasa dan Tools Protage. Universitas Gunadarma, 2006.

[7] C. Olston and M. Najork, Web Crawling Foundations and trends in information retrieval. Now Publishers Inc, 2010.

[8] N.K. Susrini, Cara Gampang Bikin Toko Online. Grasindo, 2010.

[9] B. S. Bani and S. A. Pratab, College Enquiry Chatbot Using A.L.I.C.E, International Journal of New Technology and Research (IJNTR), 2017.

[10] Sharma, Vibhor, et. All, An Intelligent Behaviour Shown by Chatbot System, International Journal of New Technology and Research (IJNTR), 2017.

[11] Nair, Gayatri, et. All, Chatbot as a Personal Assistant, Research India Publications. 2018.

[12] D.V. Sarthak, et. All, Artificial Intelligence Chatbot in Android System using Open Source Program-O, IJARCCE, 2017.